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ABSTRACT

This document contains parts of the Michigan Educational Assessment Program (MEAP). Rubrics and released items are provided for four levels and areas of the test including high school, grade 5, grade 8, and graphing items. (CCM)

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ED 427 951

MICHIGAN EDUCATIONAL ASSESSMENT PROGRAM

GRADE 5 & 8

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SCIENCE

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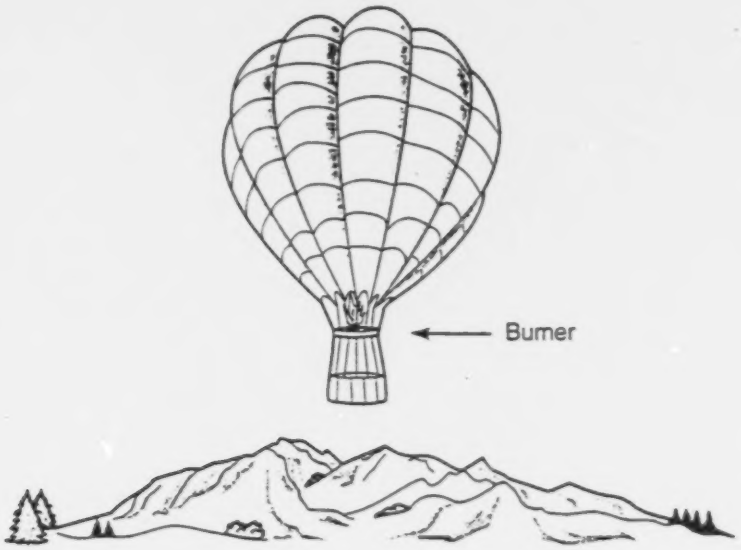
HSPT SCIENCE

1997

RELEASED ITEMS

The diagram shows a hot air balloon floating in the air. You can see the burner heating the air inside the balloon. Study the diagram. Then answer questions 1 through 4.



1 If the hot air balloon is floating—neither ascending nor descending—the mass of air displaced by the balloon must be

A less than the mass of the balloon.

B greater than the mass of the balloon.

C the same as the mass of the balloon.

D equal to an equivalent volume of water.

2 An inventor designed a device for hot air balloons that monitors the atmosphere as the balloon rises. As the air gets thinner and colder, the device signals the burner to produce more heat. This is an example of

A recycling.

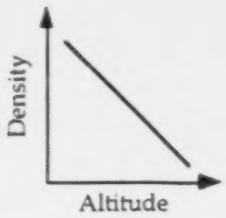
B conservation.

C feedback control.

D mathematical constancy.

3 As altitude increases, the density of the air around the balloon decreases. Which graph below shows this relationship?

A



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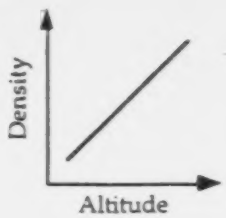

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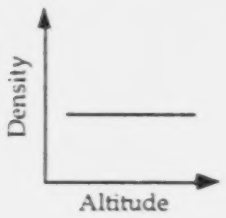

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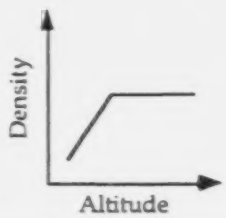

(2 points)

4 How does the temperature of the air inside the balloon affect the load that can be lifted by the balloon? In your response, be sure to include the concept of density.

ANSWER THIS ITEM IN YOUR ANSWER DOCUMENT.
NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

KEY ELEMENTS:

A: Density/Volume

- The heated air in the balloon is less dense than the surrounding air.
- Volume of air in the balloon increases as the air is heated.
- The mass of air displaced by the balloon must be greater or equal to the mass of the balloon in order for the balloon to be lifted or float.
- The mass of air inside the balloon decreases as cooler air is displaced out of the balloon.

B: Temperature/Bouyancy/Other

- The warmer the air inside the balloon, the greater the load that can be lifted.
- An increase in temperature of air inside the balloon will cause the balloon to rise.
- Balloon rises if gravitational force is less than the bouyant force.

SCORE POINTS:

2 points = Both A and B are given correctly
1 point = Either A or B are given correctly
0 points = Other

mass = volume x density
density = mass / volume
volume = mass / density

This formula given with no explanation does not receive credit, however, an explanation of the formula in relation to the heat/load relationship may be eligible for all score points.

Note: For our purposes, weight is considered to be the same as mass.

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30 Cold air is more dense than hot air. That is why hot air rises. Therefore the hotter the air inside the balloon is the more the balloon will rise because the air in the balloon will be less dence than the air outside the balloon.

Score Point: 2

This response correctly addresses both key elements (A - cold air is more dense than hot air, B - the hotter the air inside...the more the balloon will rise).

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30 The temperature of the air inside the balloon affects the load that can be lifted by the balloon by density. the more dense the balloon is the more mass the balloon has that makes balloon heavier to lift. So the hotter the temperature is the less dense the balloon is.

Score Point: 1

This response fails to correctly address the heat/load relationship, but correctly addresses the density key element (the hotter the temperature is, the less dense the balloon is).

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30 I don't think it affects the load. Density is found by mass and volume. Temperature has no correlation whatsoever to the amount of people able to be lifted. All that matters is the volume of the air to the mass of the people and the density in the air.

Score Point: 0

This response is incorrect in its claim (temperature has no correlation whatsoever). The attempt to explain volume and density does not correctly address the key elements.

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MEAP SCIENCE

1997

GRAPH ITEM

RELEASED ITEMS

GRADE 8 GRAPH ITEM

33 Mortisha and Gomez got the following data from their Tissue Strength Investigation. Please graph their results. (Be sure to include the proper scale and labels.)

Brand	Number of Pennies Held
X	22
Y	14
Z	17

ANSWER THIS ITEM IN YOUR ANSWER BOOKLET.
NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

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Grade 8

"Graph of Tissue Data"

Scoring Guide:

3 = All data and labels presented correctly.
2 = All data and 2 labels presented correctly **or**
all labels correct and an inappropriate representation of data (for example, a line graph) **or**
all labels correct with two correct data points or two bars reversed.
1 = All data and 0 - 1 label presented correctly **or**
two labels correct and one or two data presented correctly.
0 = Graph incorrect or cannot be read.

Note: Since the prompt does not instruct the student to make any particular type of graph, any correct graphic representation of the data (bar graph, point graph) should be acceptable. Do NOT accept pie charts, tables, or number lines, however.

Note: A student need not include the origin in his/her graph. Reversing the direction of the axes is acceptable, i.e. origin in lower right corner of graph.

Note: Writing the brand of tissue and/or the number of pennies it held beside each data point is sufficient labeling; a student need not label the axes more thoroughly than "X," "Y", "Z" and "Pennies Held" or "¢."

Note: Hatch-marks alone are not an acceptable representation of a vertical scale. Numbers must accompany the marks.

Note: If the height of each bar is marked correctly but the scale for "Pennies Held" is missing or non-linear (for example, only the numbers 22, 14, and 17 are shown) the highest score possible is "1."

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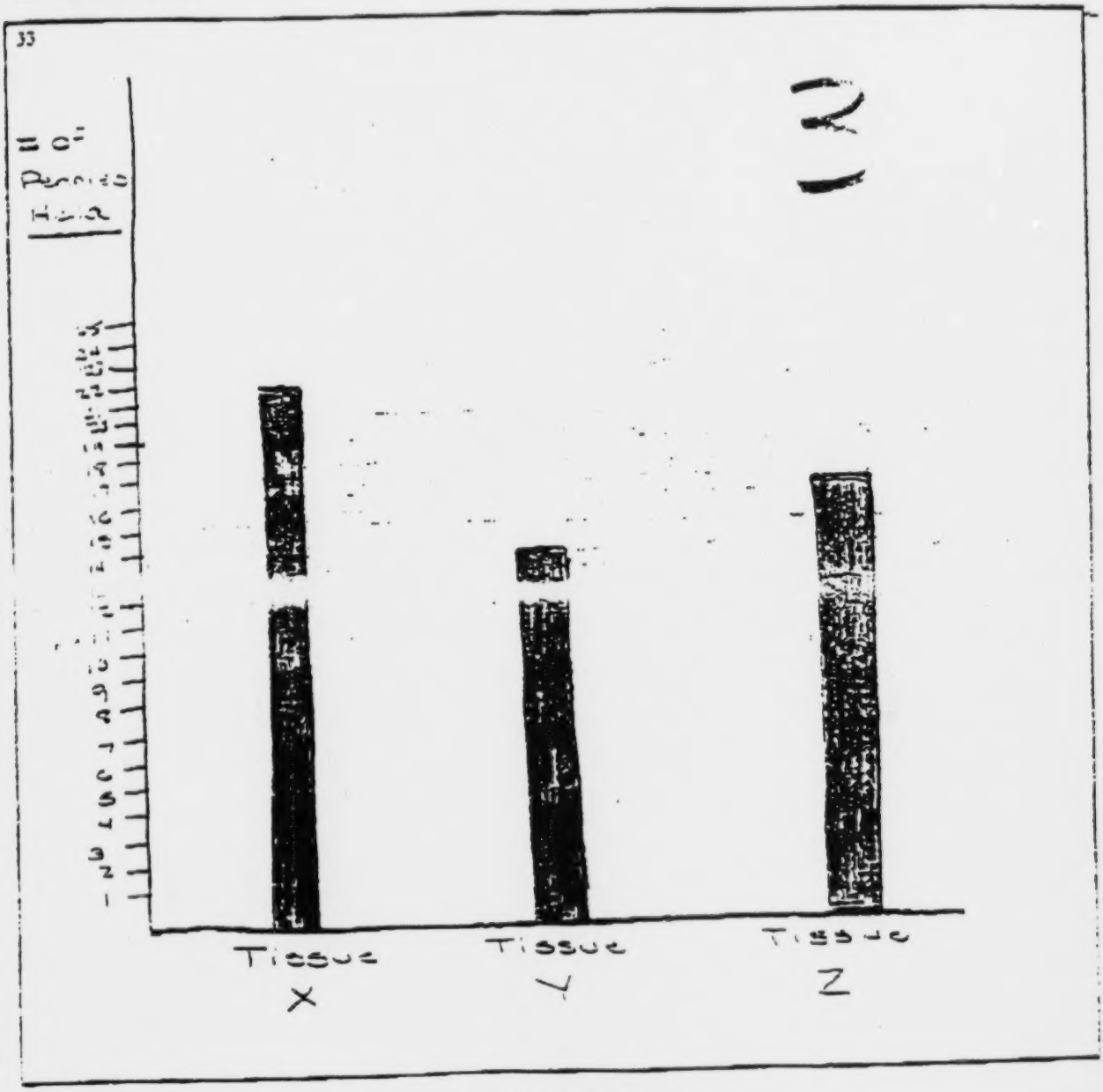
28 ⓐ ● ⓒ ⓓ
29 ⓐ ● ⓒ ⓓ

30 ⓐ ⓑ ● ⓓ
31 ● ⓑ ⓒ ⓓ
32 ⓐ ● ⓒ ⓓ

33



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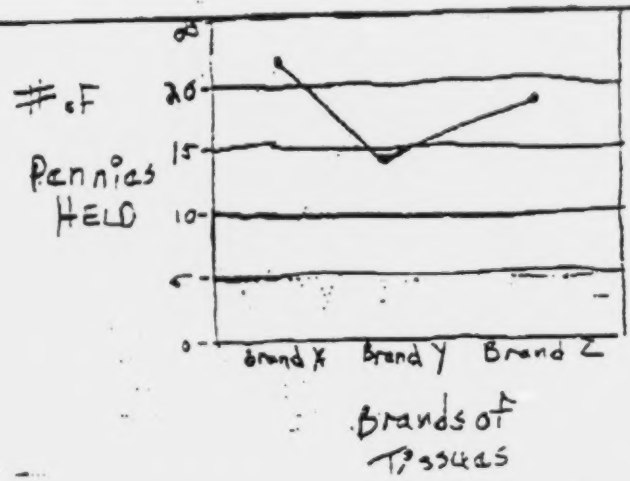
32 Ⓐ ● Ⓒ Ⓓ

33



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30 ⓐ ⓑ ● ⓓ
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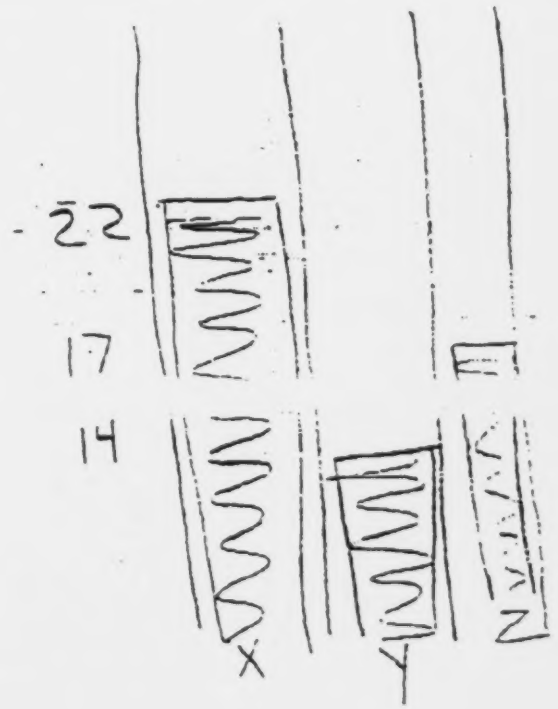
32 ⓐ ● ⓒ ⓓ

33



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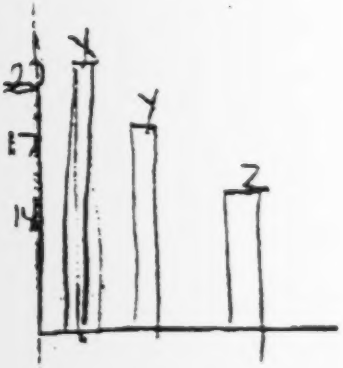
29 ⊖ ● ⊖ ⊖

30 ⊖ ⊖ ● ⊖
31 ● ⊖ ⊖ ⊖
32 ⊖ ● ⊖ ⊖

33



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MEAP SCIENCE

1997

GRADE 5

RELEASED ITEMS

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Directions: Read the following paragraph and then answer questions 1 - 5.

Shannon's family has an electric popcorn popper. It heats air and blows the hot air on the popcorn kernels to make them pop.

1 What form of energy makes the popcorn popper operate?

A sound energy, because the popcorn makes a popping sound, and you hear the motor

B electrical energy, because electricity is used to heat the air and run the fan motor

C food energy, because the popcorn is food

D motion energy, because the popcorn moves when it pops

2 Shannon melted some butter in a pan on the stove to put on her popcorn. What form of energy made the butter melt?

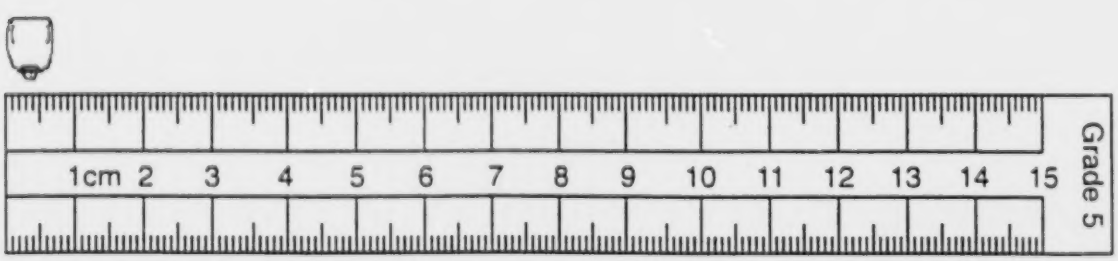
A light energy

B heat energy

C food energy

D sound energy

3 What is the width of the popcorn kernel shown in the picture?



A 5 mm B 10 cm C 5 cm D 7 mm

Directions: Read the following paragraph and use the following chart to answer questions 4 - 5.

Shannon decided to compare different kinds of popcorn to find out which was the best buy. She bought three kinds of popcorn: regular white popcorn, regular yellow popcorn, and gourmet yellow popcorn. She put 50 kernels of each kind in the popper. She kept the popper running for each batch until the popcorn stopped popping. Then she counted the number of kernels of each kind that popped. Next, she put 25 popped kernels of each kind into a measuring cup to find out which kernels popped the biggest. Then she tasted some of each kind of popcorn. Her results are shown in the chart below.

Kind of popcorn	Number of kernels that popped	Volume of 25 popped kernels	Price for a 16-ounce bag	Shannon's taste test
regular white	38	60ml	$1.19	OK
regular yellow	46	60ml	$1.19	BEST
gourmet yellow	45	80ml	$1.50	OK

4 Shannon's brother looked at her results and decided that the gourmet popcorn was the **BEST**. What evidence from the chart supports his decision?

A There is no evidence from the chart to support his decision.

B More of the gourmet popcorn popped.

C There is more popcorn in the bag of gourmet popcorn.

D The gourmet popcorn kernels popped the biggest.

5 Shannon decided that the regular yellow popcorn was the **BEST** popcorn. Identify two pieces of evidence from the chart that support her decision.

ANSWER THIS ITEM IN YOUR ANSWER BOOKLET.
NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

1997 MEAP SCIENCE RUBRICS

Grade 5

"Yellow Popcorn the Best"

Scoring Guide:

2 = Two acceptable reasons
1 = One acceptable reason
0 = No acceptable reasons

Among the acceptable reasons:

Yellow popcorn had the largest # of kernels (46 out of 50) popped.
Yellow popcorn had the best taste.
Yellow popcorn is one of the cheaper kinds/is cheap.

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16 ⊙ ⊙ ● ⊙
17 ⊙ ⊙ ● ⊙

18 ● ⊙ ⊙ ⊙
19 ⊙ ⊙ ⊙ ●
20 ⊙ ● ⊙ ⊙
21 ● ⊙ ⊙ ⊙

22 ⊙ ● ⊙ ⊙
23 ⊙ ● ⊙ ⊙
24 ⊙ ⊙ ⊙ ●

25 ⊙ ⊙ ⊙ ●

(2)

26 Two pieces of evidence from the chart support Shannons decision are regular yellow had the most kernels popped and regular yellow is the cheapest kind of popcorn.

Exp. 12-2

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16 ○ ○ ● ○
17 ● ○ ○ ○

18 ● ○ ○ ○
19 ○ ○ ○ ●
20 ○ ○ ○ ●
21 ● ○ ○ ○

22 ○ ● ○ ○
23 ○ ● ○ ○
24 ○ ○ ● ○

25 ○ ○ ○ ●

(1)

26 1. She thougn- It was the best.

2. It had more Kernal. popped.

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15 ⓐ ● ⓒ ⓓ
16 ● ⓑ ⓒ ⓓ
17 ⓐ ⓑ ● ⓓ
18 ● ⓑ ⓒ ⓓ
19 ⓐ ⓑ ⓒ ●
20 ⓐ ⓑ ⓒ ●
21 ⓐ ● ⓒ ⓓ
22 ⓐ ● ⓒ ⓓ
23 ⓐ ● ⓒ ⓓ
24 ● ⓑ ⓒ ⓓ
25 ● ⓑ ⓒ ⓓ

ⓐ

26 The regular white and regular yellow popcorn is the same but Shannon thinks the regular yellow is the Best! She thinks the gourment yellow popcorn is ok.

3080-1471

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MEAP SCIENCE

1997

GRADE 8

RELEASED ITEMS

Read the following paragraph and then answer questions 1 - 6.

Jamie was eating a sandwich for lunch and thinking about how her body uses food. She decided to do some research about what food is and what happens to it after she eats it.

1 Why was it important for Jamie to chew her sandwich before swallowing it?

A Chewing helps the food stick together more efficiently.

B Only bite-size pieces can pass through the stomach wall into the bloodstream.

C Saliva and digestive juices can operate more efficiently on smaller pieces of food.

D Chewing allows some of the food to be absorbed into the bloodstream.

2 Jamie's sandwich had lettuce on it. What two words correctly describe Jamie and the lettuce?

A consumer and producer

B producer and decomposer

C decomposer and producer

D consumer and decomposer

3 Which of the following represents the correct pathway of the nutrients in the food that Jamie has

A circulatory system—> cells—> digestive system

B circulatory system—> digestive system—> cells

C digestive system—> circulatory system—> cells

D cells—> digestive system—> circulatory system

4 Jamie observed that she seemed to gain weight during the winter months. Based on this observation, what is the **BEST** question she might investigate?

A Do fewer hours of daylight affect body weight?

B Does cold weather cause a decrease in body weight?

C Does eating sandwiches affect exercise and body weight?

D Does increasing the amount of exercise help decrease body weight?

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5 Jamie decided to start running around the block twice each day. Her diet did not change, but she did notice a change in her weight at the end of a five-week period. The following table contains the information Jamie collected from her exercise experiment.

Jamie's Weight Loss

Week	Weight (lb)
1	120
2	119
3	118
4	117
5	117

Jamie concluded that running helped her lose weight. Do the results in the table support her conclusion?

A Yes, because the data does show that Jamie lost weight.

B Yes, because eating healthy foods helped Jamie lose weight.

C Yes, because eating sandwiches affected Jamie's ability to exercise.

D Yes, because the more times Jamie ran around the block each day, the more weight she lost.

6 The muscles in Jamie's legs use nutrients from the sandwich she ate. Describe one physical change and one chemical change food must go through before Jamie's body can use these nutrients.

ANSWER THIS ITEM IN YOUR ANSWER BOOKLET.
NOTHING WRITTEN IN THE SPACE BELOW WILL BE SCORED.

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Grade 8

"Muscles in Jamie's Legs"

Scoring Guide:

2 = One physical change **and** one chemical change.
1 = One physicial change **or** one chemical change.
0 = An incorrect response.

Among the acceptable physical changes are:

- Jamie's teeth break the food into smaller pieces.
- Nutrients are absorbed/dissolved into Jamie's blood stream.
- The food was sliced, cut up, cooked, etc.

Among the acceptable chemical changes are:

- The acid (juices) in Jamie's stomach break the food down
- Jamie's saliva starts to break down the food.
- Enzymes help to break down the food.
- The food was cooked first.

1 ⓐ ⓑ ● ⓓ
2 ● ⓑ ⓒ ⓓ
3 ⓐ ⓑ ⓒ ●
4 ● ⓑ ⓒ ⓓ
5 ⓐ ⓑ ⓒ ●
6 ● ⓑ ⓒ ⓓ

7 ● ⓑ ⓒ ⓓ
8 ⓐ ⓑ ⓒ ●

9 ⓐ ⓑ ● ⓓ
10 ● ⓑ ⓒ ⓓ
11 ⓐ ⓑ ● ⓓ
12 ● ⓑ ⓒ ⓓ

13 ● ⓑ ⓒ ⓓ

14 Before the muscles in Jamie's legs can use the nutrients, the food has to be broken down. One physical change that must take place is mechanical digestion in the mouth. When you eat, you must chew your food before you swallow it. The teeth in Jamie's mouth cut, grind, and generally break up the food in her mouth. But that isn't enough. A chemical change called chemical digestion has to occur to break down the food even more. Starting in the mouth, and even more so in the stomach and small intestines, enzymes help break up food into nutrients. Pepsin breaks up proteins. Ptyalin works on starches, etc.. Finally, after all the enzymes and hydrochloric acid have acted on the food and broken it down into nutrients, it is ready to be absorbed into the blood and taken to Jamie's leg muscles.

2 pts

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1	●	○	○	○
2	○	○	○	●
3	○	○	●	○
4	●	○	○	○
5	○	○	○	●
6	●	○	○	○
7	○	○	●	○
8	○	○	○	●
9	○	○	○	●
10	●	○	○	○
11	○	○	●	○
12	●	○	○	○
13	○	○	○	●

14 In oder for Jamie's leg's to get nutrients the physical change is the food. It has to get smaller in order for it to flow to the bloodstream to get to her leg. A chemical change would be that the food changed shaped.

1 Pt

BEST COPY AVAILABLE

1	①	②	●	④
2	①	●	③	④
3	①	②	③	●
4	①	②	●	④
5	①	②	③	●
6	●	②	③	④
7	①	②	●	④
8	①	②	③	●
9	①	②	●	④
10	●	②	③	④
11	●	②	③	④
12	①	●	③	④
13	①	②	③	●

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14 One physical change is her legs become stonger. One cnemical change is that her food flows through the bloodstream to make her legs stronger.

Ø pts

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